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FIG. 1A

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FIG. 1B

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```
┌──────────────┐   ┌──────────────┐   ┌──────────────┐   ┌──────────────┐
│  Processor   │   │     Disk     │   │     Main     │   │    Input     │
│     155      │   │    Memory    │   │    Memory    │   │   Device     │
│              │   │     160      │   │     165      │   │    170       │
└──────┬───────┘   └──────┬───────┘   └──────┬───────┘   └──────┬───────┘
       │                  │                  │                  │
───────┴──────────────────┴──────────────────┴──────────────────┴──────────
                          │                                        Bus
                          │                                        190
               ┌──────────┴──────────────┐
               │   Graphics Controller    │
               │          175             │
               │   ┌──────────────────┐   │
               │   │                  │   │
               │   └──────────────────┘   │
               └──────────┬───────────────┘
                          │          Calculation Module
                          │               180
               ┌──────────┴──────────┐
               │   Display Device    │
               │        185          │
               └─────────────────────┘
```

150

FIG. 2

Application No.: 10/602,248
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SYSTEM AND METHOD FOR EFFICIENT HARDWARE
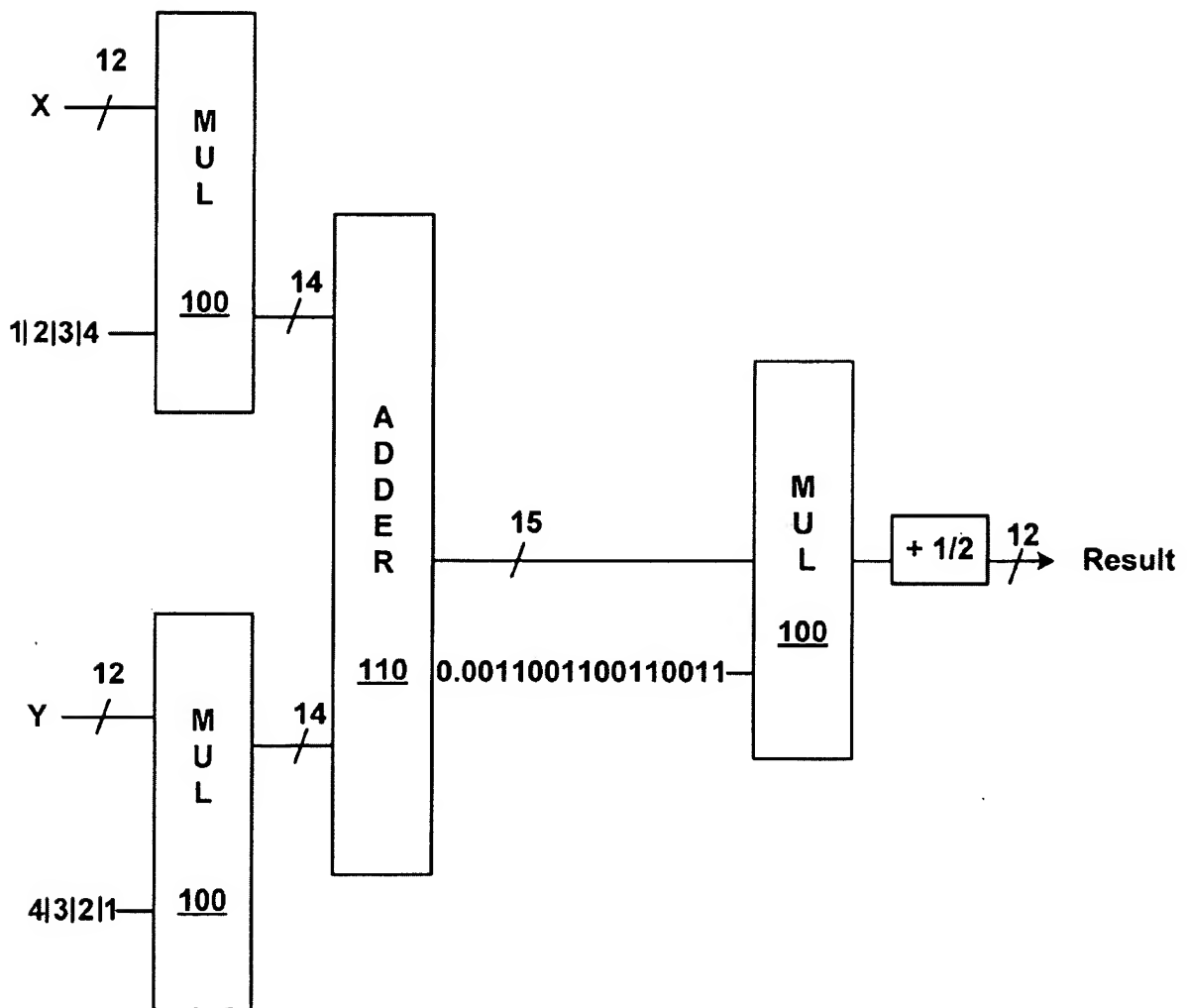IMPLEMENTATION OF A PERFECT PRECISION BLENDING FUNCTION
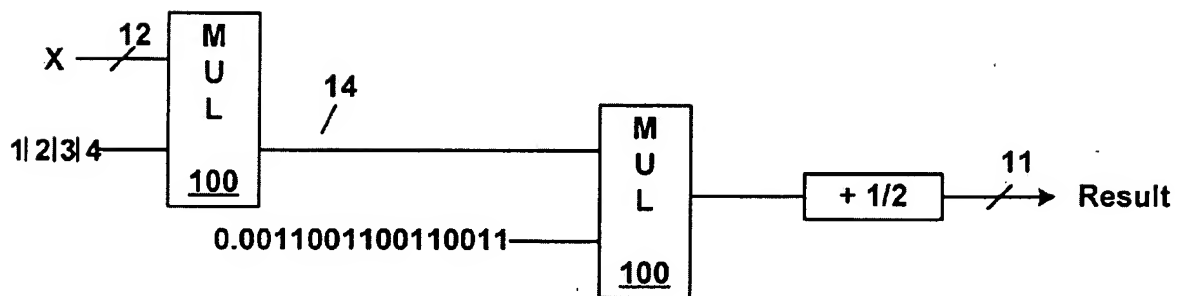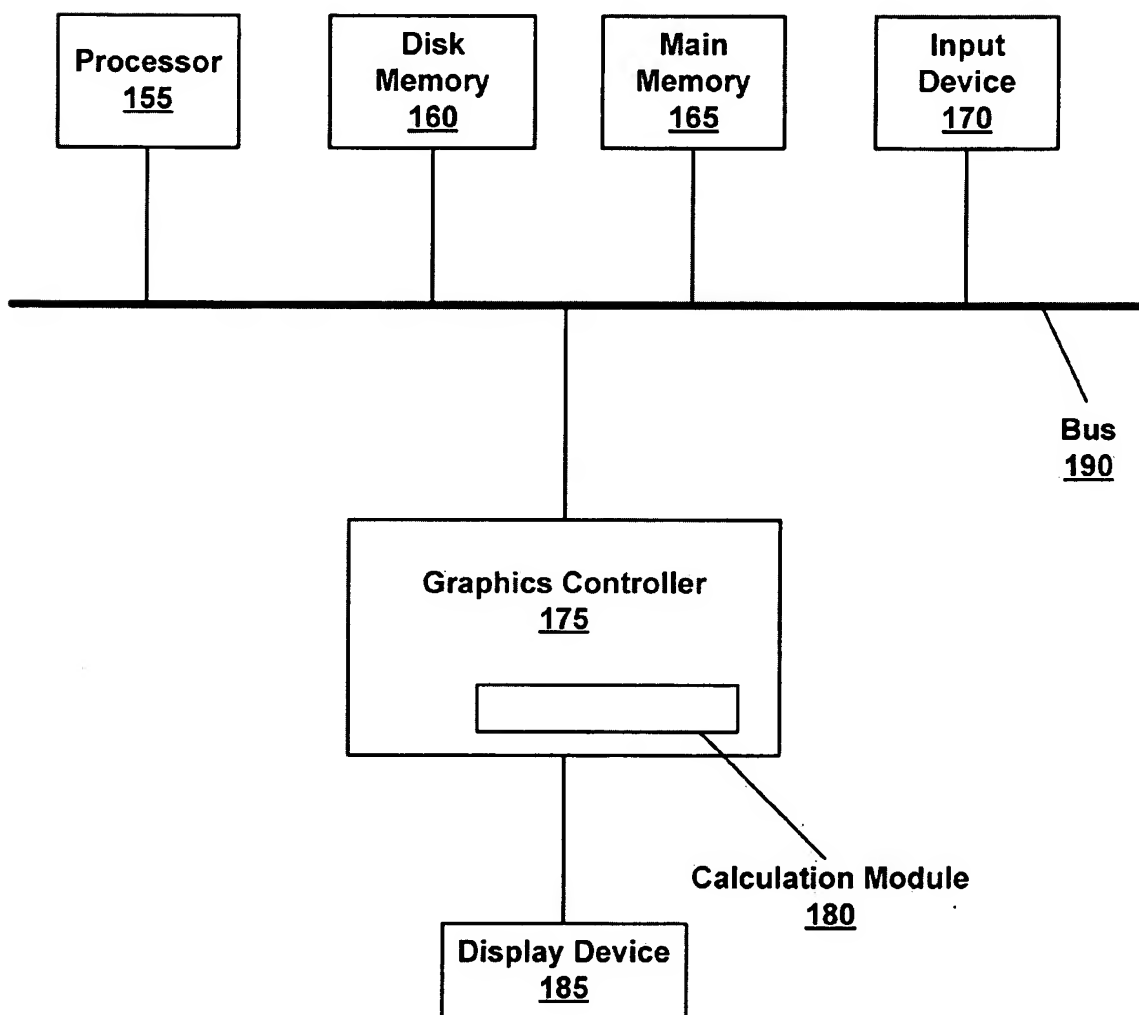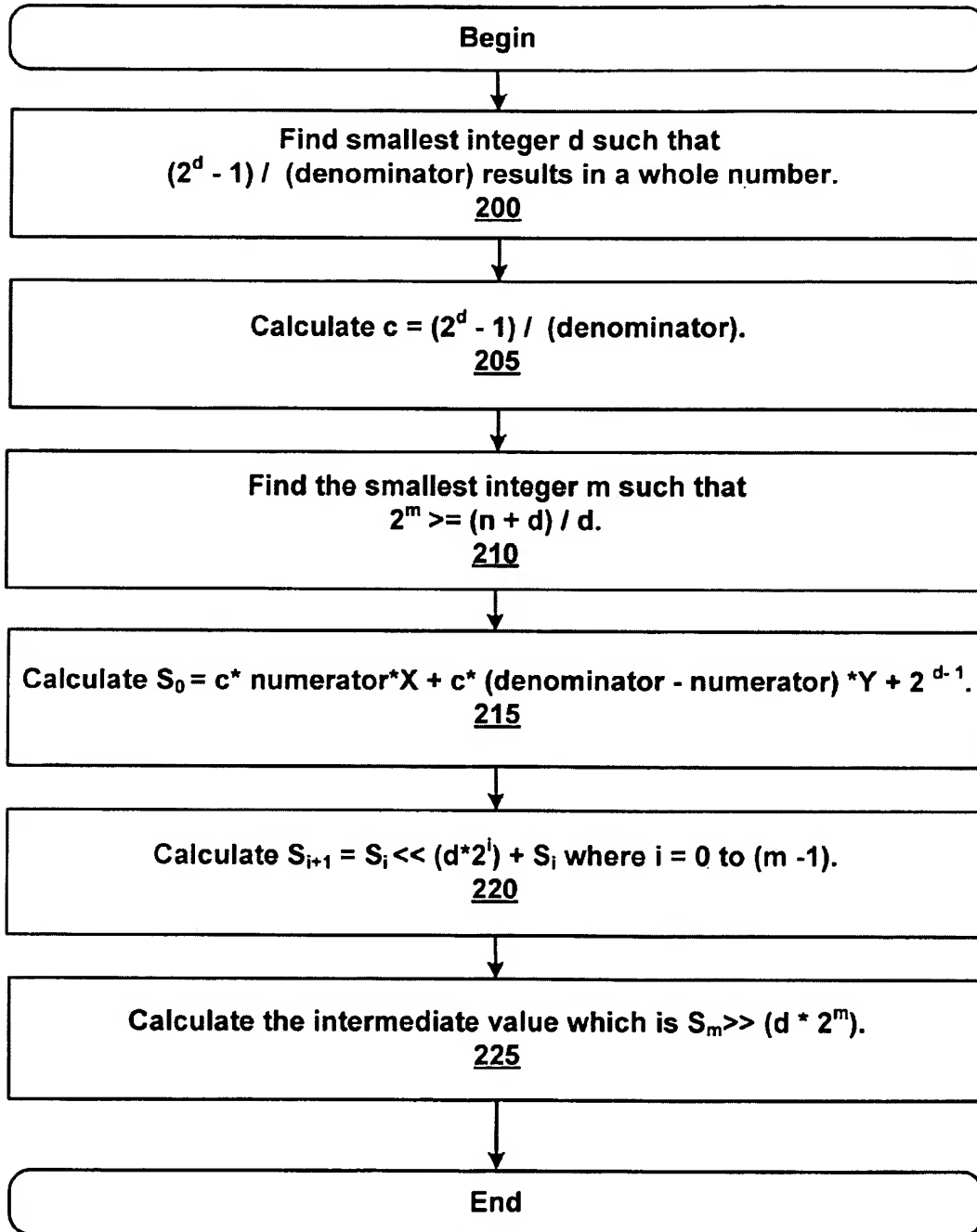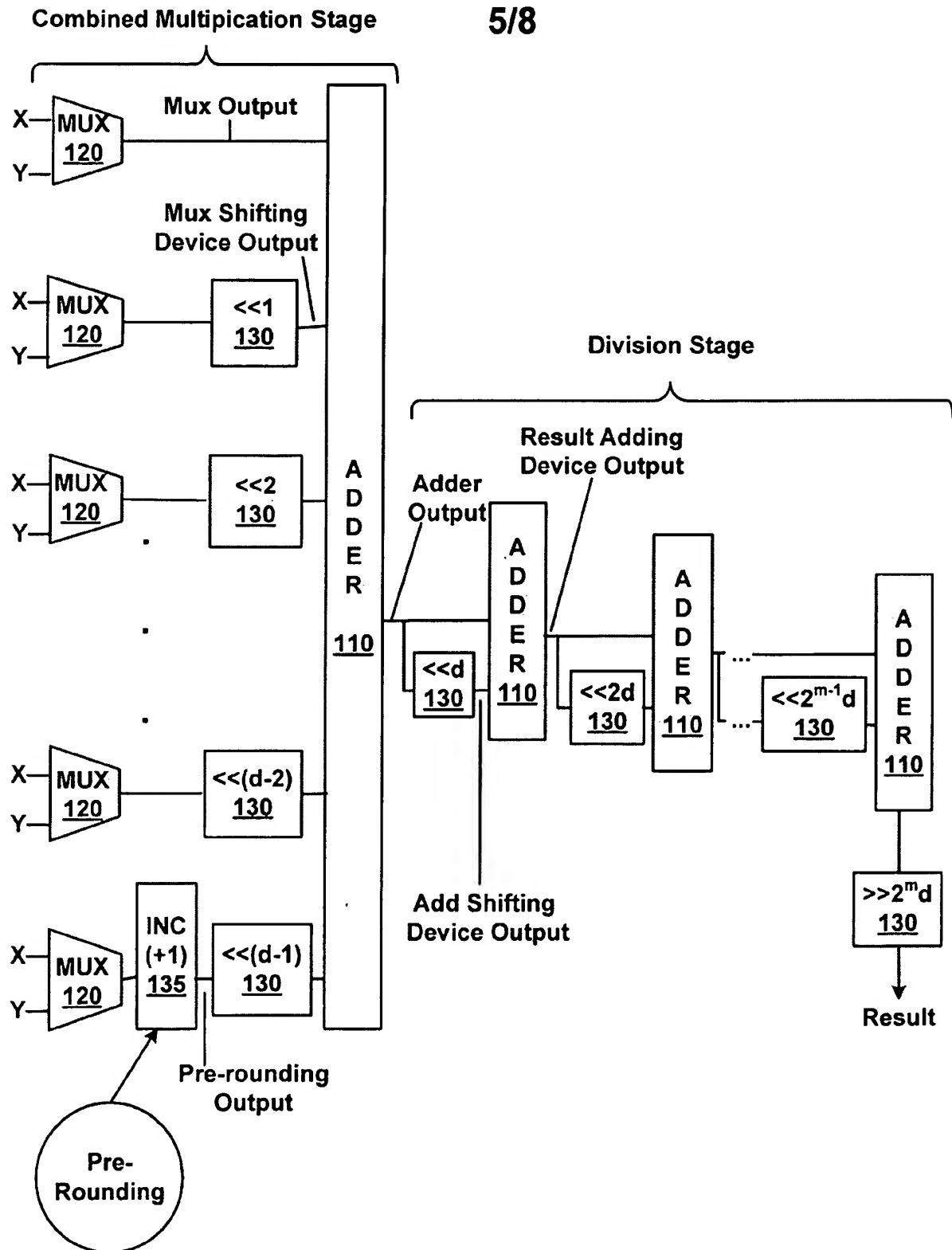Attorney Docket No.: 2207/760602

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```
┌──────────────────────────────────────────────────────────┐
│                          Begin                            │
└──────────────────────────────────────────────────────────┘
                              │
                              ▼
┌──────────────────────────────────────────────────────────┐
│              Find smallest integer d such that            │
│     (2^d - 1) / (denominator) results in a whole number.  │
│                           200                             │
└──────────────────────────────────────────────────────────┘
                              │
                              ▼
┌──────────────────────────────────────────────────────────┐
│          Calculate c = (2^d - 1) / (denominator).         │
│                           205                             │
└──────────────────────────────────────────────────────────┘
                              │
                              ▼
┌──────────────────────────────────────────────────────────┐
│            Find the smallest integer m such that          │
│                   2^m >= (n + d) / d.                     │
│                           210                             │
└──────────────────────────────────────────────────────────┘
                              │
                              ▼
┌──────────────────────────────────────────────────────────┐
│  Calculate S_0 = c* numerator*X + c* (denominator -       │
│  numerator) *Y + 2^{d-1}.                                 │
│                           215                             │
└──────────────────────────────────────────────────────────┘
                              │
                              ▼
┌──────────────────────────────────────────────────────────┐
│  Calculate S_{i+1} = S_i << (d*2^i) + S_i where i = 0     │
│  to (m -1).                                               │
│                           220                             │
└──────────────────────────────────────────────────────────┘
                              │
                              ▼
┌──────────────────────────────────────────────────────────┐
│  Calculate the intermediate value which is S_m>> (d*2^m). │
│                           225                             │
└──────────────────────────────────────────────────────────┘
                              │
                              ▼
┌──────────────────────────────────────────────────────────┐
│                          End                              │
└──────────────────────────────────────────────────────────┘
```

Find smallest integer d such that $(2^d - 1)$ / (denominator) results in a whole number.
200

Calculate $c = (2^d - 1)$ / (denominator).
205

Find the smallest integer m such that $2^m \geq (n + d) / d$.
210

Calculate $S_0 = c*$ numerator$*X + c*$ (denominator - numerator) $*Y + 2^{d-1}$.
215

Calculate $S_{i+1} = S_i << (d*2^i) + S_i$ where i = 0 to (m -1).
220

Calculate the intermediate value which is $S_m >> (d * 2^m)$.
225

FIG. 3

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Combined Multipication Stage

FIG. 4

Application No.: 10/602,248
Tom ALTUS et al.
SYSTEM AND METHOD FOR EFFICIENT HARDWARE
IMPLEMENTATION OF A PERFECT PRECISION BLENDING FUNCTION
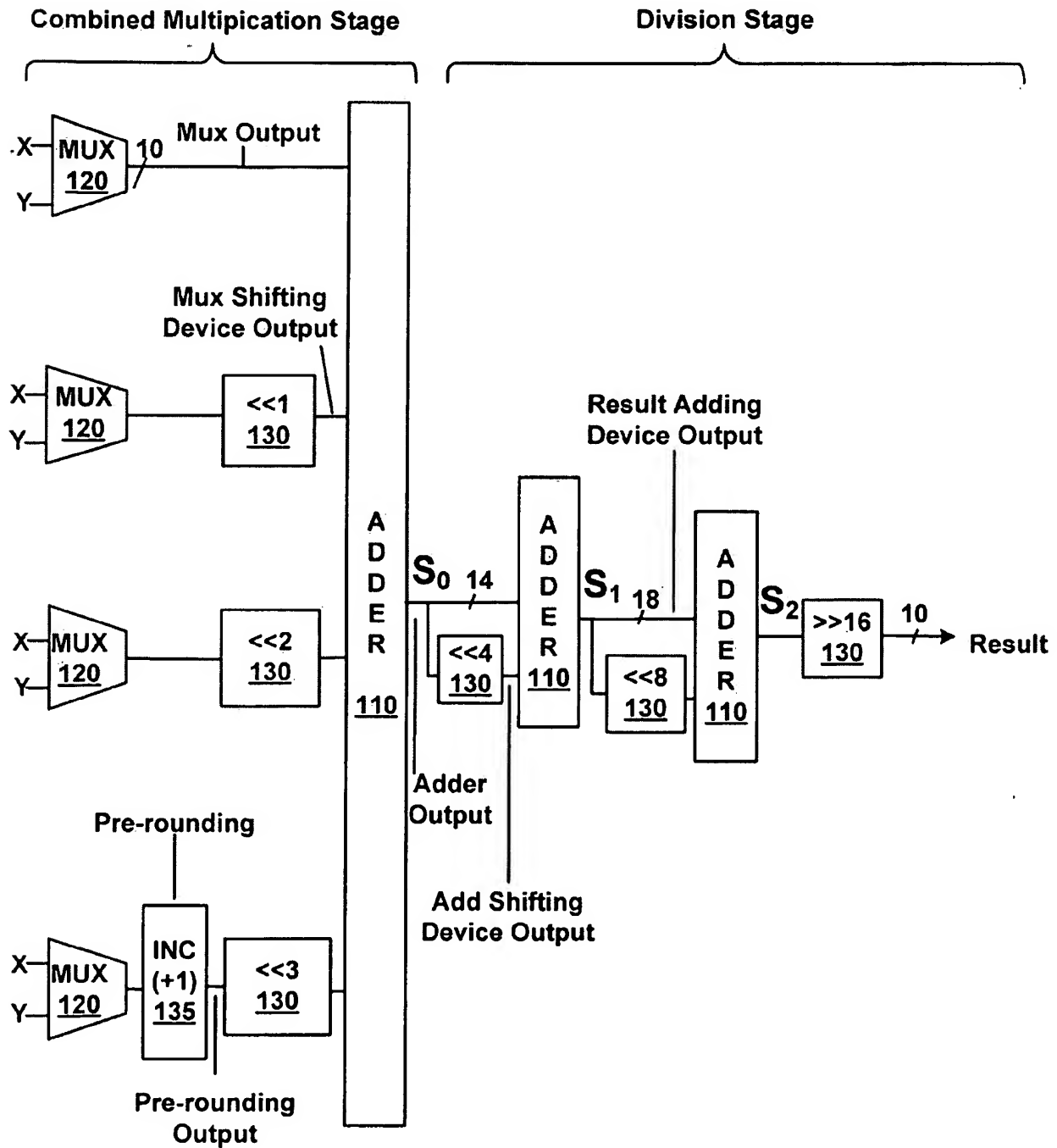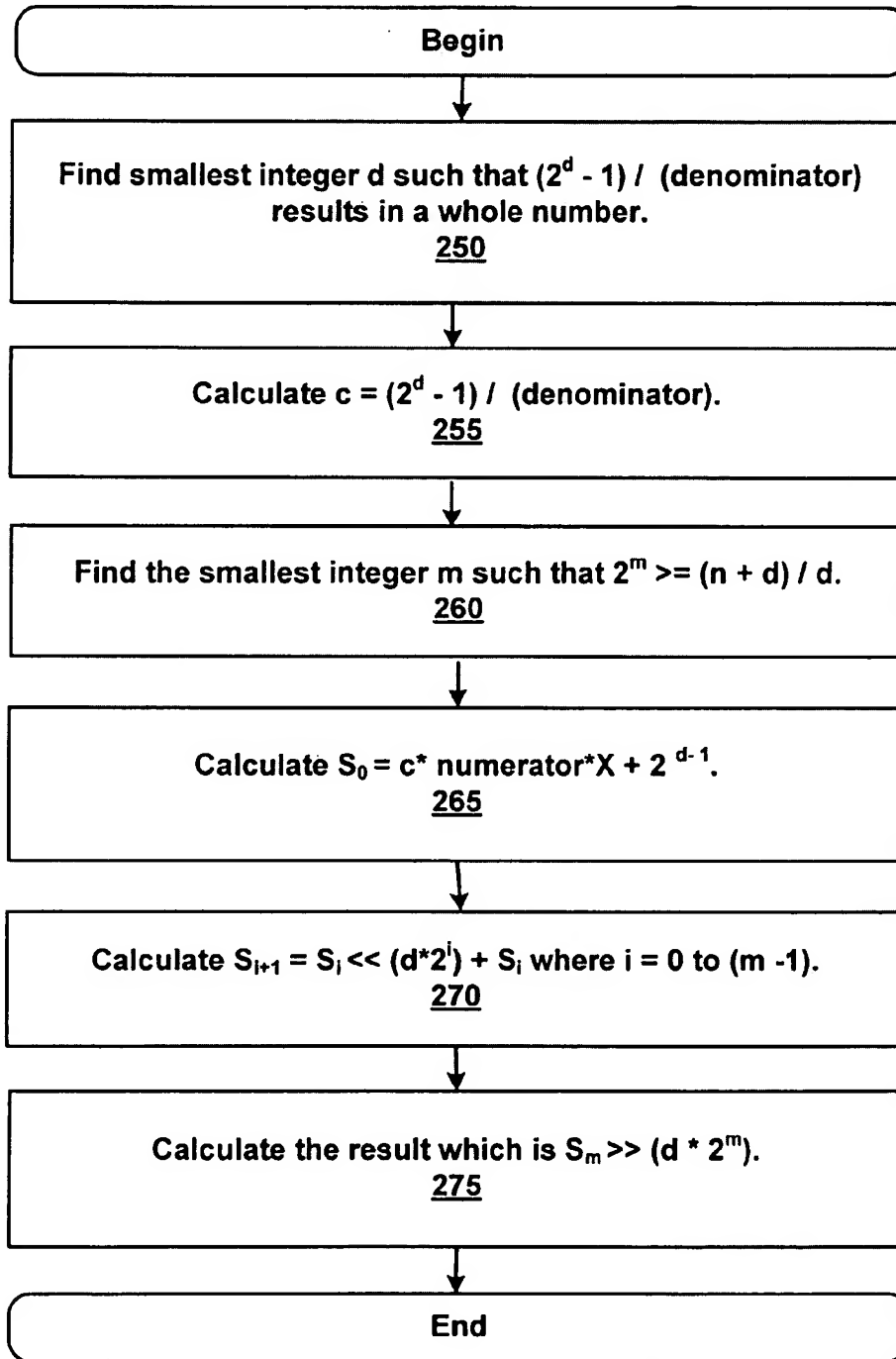Attorney Docket No.: 2207/760602

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FIG. 5

Application No.: 10/602,248
Tom ALTUS et al.
SYSTEM AND METHOD FOR EFFICIENT HARDWARE
IMPLEMENTATION OF A PERFECT PRECISION BLENDING FUNCTION
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Begin

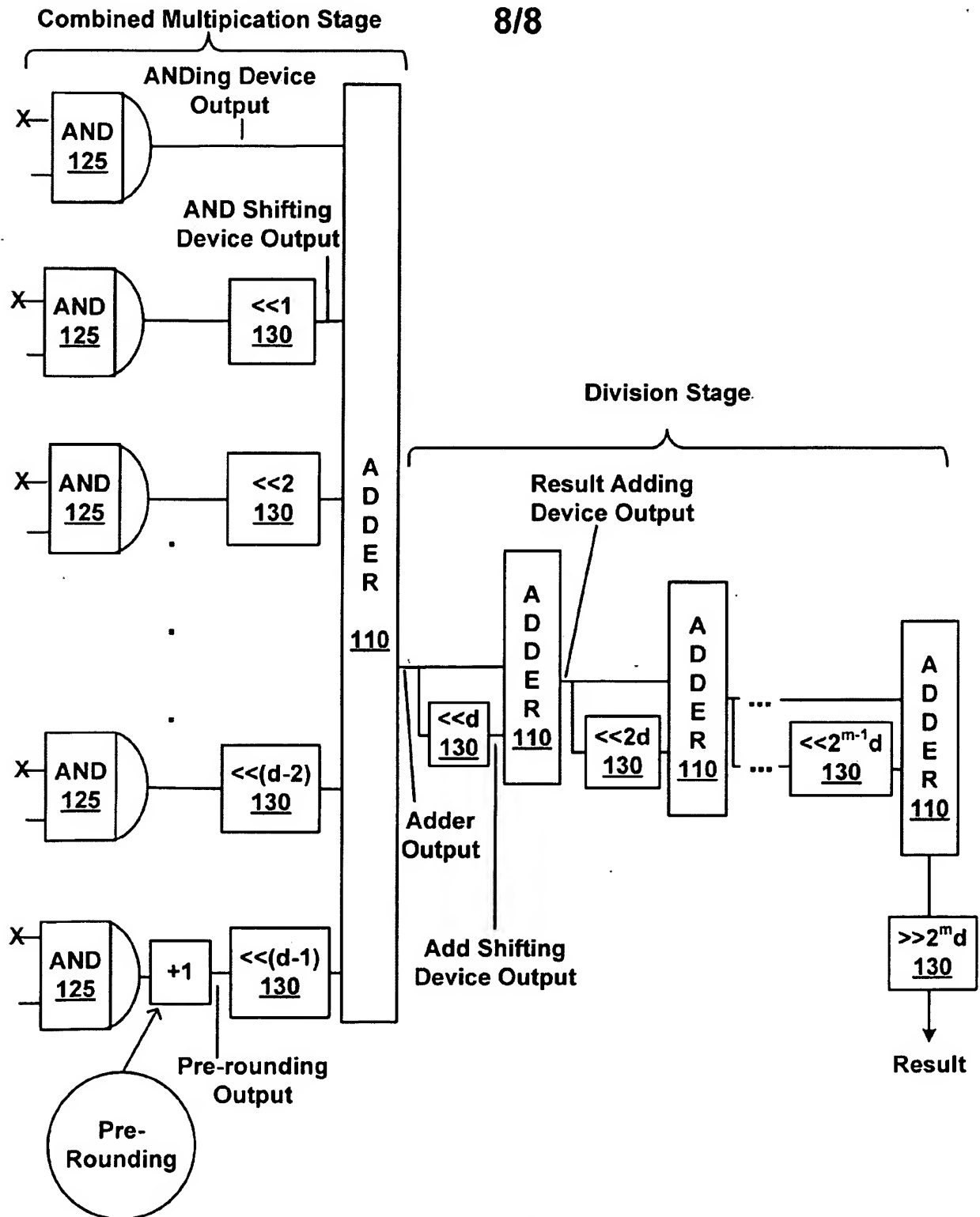Find smallest integer d such that $(2^d - 1)$ / (denominator) results in a whole number.
250

Calculate $c = (2^d - 1)$ / (denominator).
255

Find the smallest integer m such that $2^m >= (n + d) / d$.
260

Calculate $S_0 = c *$ numerator*X + 2^{d-1}.
265

Calculate $S_{I+1} = S_i << (d*2^i) + S_i$ where i = 0 to (m -1).
270

Calculate the result which is $S_m >> (d * 2^m)$.
275

End

FIG. 6

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Combined Multipication Stage

ANDing Device Output

AND Shifting Device Output

Division Stage

Result Adding Device Output

X — AND 125

X — AND 125 — <<1 130

X — AND 125 — <<2 130

X — AND 125 — <<(d-2) 130

X — AND 125 — +1 — <<(d-1) 130

ADDER 110

<<d 130 — ADDER 110 — <<2d 130 — ADDER 110 — ... — <<2^{m-1}d 130 — ADDER 110

Adder Output

Add Shifting Device Output

>>2^m d 130

Result

Pre-rounding Output

Pre-Rounding

FIG. 7